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UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports\*  
for

SOIL CONSERVATION SERVICE RESEARCH\*\*

JANUARY 1948

EROSION CONTROL PRACTICES DIVISION

Need for Soil and Water Conservation Research in New York -  
John Lamb, Jr., Ithaca, New York. - "Permanent productive agriculture is a balance between the factors that use up the soils reserve of productive capacity and the factors that built up those reserves. In times of national peril with food an essential weapon, these productive reserves are exploited. During such periods, most research and change in methods speeds up the exploitive process. It is essential that an equal amount of research is pointed toward maintenance and building up.

"The productive capacity of a soil is intimately related to chemical and physical characteristics that largely depend upon the reserve of resistant soil organic matter. Nature concentrated this organic matter in the upper few inches of the soil surface.

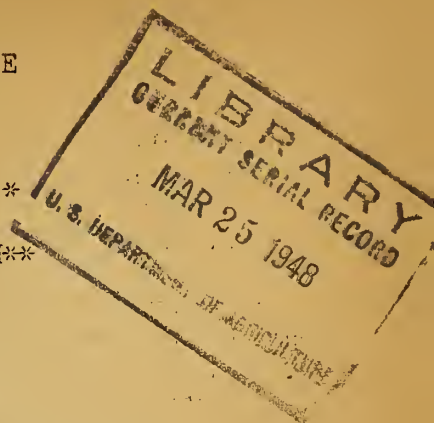
"The few years of specific erosion research was of necessity devoted to finding out the nature of the problem, its extent and the defense against existing hazards. This has revealed that the chief hazard is the rate and methods of crop production itself. The rate and methods are changing faster and faster with the application of modern science. New threats require constant changing defense.

"The soil has an occupational disease. That disease is erosion. Before erosion is evident to the eye, many changes have already taken place. The natural, internal defense of the soil against erosion have broken down. Most of these changes are bad for the growth of healthy plants. They are concerned with poor nutrition, bad elimination, sluggish movement of water and air in the soil. It must constantly be kept in mind that the soil is a living thing with approximately as many pounds per acre of life you don't see as plants and animals you can see.

"New research in soil and water conservation must keep abreast and ahead of such recent developments as those in tillage implements and chemical cultivation. These and other pressing research problems are outlined briefly.

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\*\* All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.



## Modern Tillage

"Many of the new machines, due to almost unlimited power, are very effective in stirring the soil. This destroys soil structure directly due to impact, and indirectly due to a speed up in oxidation of organic matter. Both decrease the resistance of the soil to the forces of erosion.

"Power machinery compact soils due to weight and vibration. Studies on the productive Honeoye limestone soil at Marcellus showed an eroded soil with 2.8 per cent organic matter and a less eroded soil nearby with 4.1 per cent. These were subjected to compaction equivalent to that under the rubber tire of a two-plow tractor, or an empty farm truck. The eroded soil reached a volume weight of 1.61 with moisture content of 21 per cent at maximum compaction. The less eroded soil reached a volume weight of 1.47 with moisture content of 26 per cent at maximum compaction. Water moved through this soil very slowly at a volume weight of 1.61. The lesson is that it is necessary to wait until this eroded soil is quite dry before it can be farmed with safety. This is very important in New York. The springs are usually cold and wet, and the growing season short. It is also necessary to get the crop in early and establish a large root system before the usual hot, dry periods of mid-summer. Thus, an eroded soil is inefficient in its use of machinery, and may shorten the effective growing season. Compaction is one phase of the occupational disease of erosion. There is need for immediate studies on the following problems: (1) Further correlation of measured degree of compaction with observed runoff and erosion. (2) Determination of the persistence of undesirable compaction. (3) Devising of a quick and easy method of measuring compaction.

## Fertilizer Efficiency

"In 1947, fertilizer was applied for corn at the rate of 1,000 pounds of 10-10-10 per acre on three soil types where there had been recent, differential erosion. The corn yields varied from 15 to 100 bushels per acre. The low yields were on plots that had lost the most soil in the last 10 years. An eroded soil is an unhealthy soil, and is inefficient in its use of fertilizers. This is another phase of the occupational disease of erosion. It is essential for research to find out if this damage is permanent, and ways of speeding recovery.

## Chemical Weed Control

"The elimination of weeds by means of chemicals will require a new approach from the standpoint of soil and water conservation. It has great possibilities, but improperly used, could be of great harm. First, tillage roughened and left marks on the surface. This could retard water movement and increase surface storage capacity. Chemicals could leave a smooth surface. Second, weeds were nature's methods of protecting the soil surface. They were usually present in force before the crop was harvested. If we eliminate weeds, their desirable features must be replaced through intelligent, planned effort. The third factor is a very important one -- the effect of chemicals on the unseen life of the soil. Proper living conditions for this organic life leads to a soil that allows the ready entrance of water into and through the soil. We are planning research on this problem.



### Stream Bank Erosion

"The control of stream bank erosion on small streams is largely a matter of chance. There are 65,000 miles of streams, mostly small, in the State. Twenty thousand of these are trout waters where adequate control is an important factor for effective fish and wildlife management. The New York State Conservation Department would be glad to cooperate in a streambank research problem.

"Precipitous streams levelling off into the valleys do severe damage to roads, bridges and other structures. Mr. Silas Stimson, a supervisor from Tioga County, estimates to properly correct such damage in his one county would cost \$1,000,000. This is approximately equal to the assessed valuation of all the farm land. There is no research underway.

### Vineyard Erosion Control

"The New York wine industry represents an annual business of over \$10,000,000. This rests on a one-mile wide, narrow band of soil about the shores of the Finger Lakes in New York. The steep slopes above the water provide the long season and air drainage that grow fine wine grapes. The past history has been one of abandonment of a site in about 30 years when erosion control is ignored. Erosion control research has helped this industry and could give continuous, profitable service. It could assist in the adaptation of modern machines and chemicals to steep, hillside grape culture. Another subject for research is the planting of new, hardy-root stock vines on eroded sites. Only a start has been made on this. Most of the best soils for grapes in the wine belt are already in use. New plantings are spreading to less favored soils. Soil and water conservation on such sites is doubly important to prevent waste of natural resources, labor, and capital.

### Irrigation

"In many New York localities, four years out of five, irrigation would increase yields of crops. Water supply, storage, when, and how much to irrigate, are largely unknown problems. A small start on such research is underway. In the meantime, many farmers are considering and making heavy investments for irrigation equipment without adequate answers to the above questions.

### Runoff from Small Watersheds

"Adequate flood control information on runoff from farm fields is lacking. Such information is also valuable in saving water from a time of excess to the time of shortage, when it is needed for irrigation and other farm purposes. At the Arnot Station, five weirs were constructed to measure such runoff in 1940-41. The expense of installation is large in comparison to the cost of maintenance. Ten years records are required to secure reliable information. The operation of these weirs was discontinued in July 1947 due to lack of funds.

## Research Needs of the Soil Conservation Service Technicians

"These needs were determined by the men in the field, and tabulated at a meeting of Soil Conservation Service zone technicians and research workers at Upper Darby, Pa., March 6-7, 1947:

<u>Priority</u>	<u>New and additional research needed</u>
1	- Runoff from + 25 acres. Water yield under various types of cover, slopes and exposures.
1	- Maximum safe velocities: Channels and outlets with different covers.
1	- Erodibility of soil: Detachability, and transportability.
1	- Drainage: Effectiveness on various soil types, permeability, tile depth and spacing, open ditches.
1	- Soil deterioration: Class of level and sloping land.
1	- Hydrologic design of farm ponds in the Northeast.
1	- Curved rows: Limits of curvature.
1	- Dam construction: Methods and costs. Mechanical soil limits for core material. Artificial seals.
1	- Stubble mulch machinery for the Northeast.
1	- Organic matter: Relating to soil crusting and content of available water.
1	- Strip spacing with diversion terraces.
1	- Cover crops in rotation; climatic limitations.
1	- Soil compaction by farm machinery.
1	- Application of local rainfall data to soil conservation district problems.
1	- Slope limits for erosion control as related to capability groups.
2	- Irrigation: When, how much, rate, manner of application, water supply and costs.
3	- Shrubs as a woodland border.
3	- Windbreaks: Vegetative and mechanical.
3	- Bench terraces.
4	- By-products for woodlots.
4	- Farm machinery slope limits: Fitting, cultivation and harvesting.
4	- Economic use of farm labor for forest improvement; total, peak, balance.
4	- Cost of S.C.S. farming.
4	- Rehabilitation of old pastures: Brush removal and control.
4	- Adjusting machinery to S.C.S. practices.
4	- Fertilizer recommendations.
4	- Contour furrows.
4	- Basin spreaders.

### Basis of Priority

- 1 - Immediate and urgent need.
- 2 - Immediate need but less urgent.
- 3 - Need for continuation of investigations.
- 4 - Information may be largely secured by study of past research, Soil Conservation District records, and recommending additional research needed.



Annual Soil and Water Losses Under Different Cropping Systems -  
O. R. Neal, New Brunswick, New Jersey.-"Four different 3-year cropping systems are operated on the runoff plots. System I represents conditions of continuous cultivation without cover crops, sod, or other organic matter additions to the soil. System II includes a year of clover and timothy sod in each 3-year rotation cycle. System III represents conditions of cultivation each year combined with intensive cover cropping and organic matter maintenance practices. System IV combines the conservation measures of Systems II and III. The total amounts of soil and water lost during 1947 from each crop in each of the rotations is shown in the following table.

Crop	System I		System II		System III		System IV	
	Soil loss	Runoff	Soil loss	Runoff	Soil loss	Runoff	Soil loss	Runoff
	lbs./A	Inches	lbs/A	Inches	lbs./A	Inches	lbs/A	Inches
Sod			-	0.24			-	0.28
Peas					1848	1.02		
Peas followed by beans	5736	3.70						
Tomatoes	2896	4.63	1352	1.40	1171	1.02	457	0.41
Sweet corn	2962	4.91	1084	1.49	738	0.69	526	0.86
Average	3865	4.41	812	1.04	1252	0.91	328	0.52

"The value of grasses and legumes, alone or in mixtures, for the conservation of soil and water is well recognized. During recent years increased emphasis has been placed on the growing of these crops in rotation on cultivated land. Such rotations appear highly beneficial in maintaining favorable aeration, porosity, and generally good physical conditions necessary for vigorous crop growth as well as for conservation.

"Throughout 1947 no soil loss occurred from the sod plots. The average losses from all the areas cropped to System I was 3865 pounds of soil and 4.41 inches of water. Losses were reduced in all the other systems ranging down to 328 pounds of soil and 0.52 inch of water from all crops of System IV."

Interest in Field Trials - Torlief S. Aasheim, Bozeman, Montana.-"The field trial which has been conducted near Froid, Montana since 1940 was declared terminated some time ago. The Soil Conservation District Supervisors, the County Extension Agent and other interested parties have objected to this work being closed. The Soil Conservation District Supervisors have indicated their willingness to contribute a substantial sum of money for hiring temporary assistants if this work can be continued. Indications now are that this work will be continued in 1948 with supervision from the Project Supervisor, some equipment furnished by the Soil Conservation Service and in cooperation with the newly

established Branch of the Montana Agricultural Experiment Station at Sidney. The Project Supervisor does not anticipate that it will be necessary to spend too much time in supervision of this work if sufficient assistance is provided."

Percentage Aggregation of Selected Marlboro Plots - Sterling  
J. Richards, New Brunswick, N. J. -

Plot No.	% Aggregation	Treatment
<u>Corn Plots 1947</u>		
213	58	Continuous sweet corn - Rye cover crop
232	65	Continuous sweet corn - Ryegrass & vetch cover crop
233	62	Continuous sweet corn - Ryegrass cover crop
235	68	Rested 1946 - Oats, soybeans and rye
236	70	Rested 1946 - Clover, timothy & rye
237	68	Rested 1946 - Oats, corn, rye
Lesp. A	61	Rested 1945 and 1946 - Lespedeza
<u>Alfalfa Plot</u>		
234	60	Alfalfa - 1946 and 1947
<u>Potato Plots - 1947</u>		
220	56	Wheat - 1946; normal cultivation - 1947
221	67	Wheat - 1946; subsurface cultivation - 1947

"In connection with the writing of a project on the 'Structural Improvement of Soils for the Northeastern Region', a survey of the needs for research on this subject was undertaken for Delaware, Maryland, and New Jersey. This project is being prepared by a Sub-committee of the Northeastern Soil Research Committee."

Effect of Fertilizers and Crop Rotations on the Production of Wheat - Harley A. Daniel, Guthrie, Oklahoma.-"Various amounts of ammonium nitrate (32.5%) were applied on wheat in March annually. The first application was made in 1945. The treatments were applied in duplicate on both plowed and stubble mulched land.

"Another study including phosphorus and nitrogen fertilizers in combinations with legumes, was started in the fall of 1945. Each of these fertilizers and cropping systems was applied in triplicate treatments.

"The effectiveness of the various amounts of nitrogen fertilizer is given in the following table. These results are quite variable but the data in general indicates that the wheat responded slightly to the commercial nitrogen fertilizer. The greatest response, however, appears to be on the stubble mulch land.

"The effect of phosphorus and nitrogen fertilizers and winter legumes are given in Table 2. Although these results represent two years only, they tend to show the importance of legumes and phosphorus fertilizers for wheat production in north western Oklahoma. The wheat on the plots receiving phosphorus made a more rapid growth in the spring and also matured earlier than the check plots. The best results to date have been obtained from a combination of superphosphate and nitrogen fertilizer



or superphosphate following winter peas.

Table 1.--Effect of Ammonium Nitrate on the Yield of Wheat on Plowed and Stubble Mulch Land at the Wheatland Conservation Experiment Station, Cherokee, Oklahoma.

Plot No.	Pounds Fertilizer per acre <sup>2/</sup>	Yield Per Acre <sup>1/</sup>			
		Plowed		Stubble Mulched	
		Straw tons	Grain Bu.	Straw Tons	Grain Bu.
0	Check	1.23	17.7	1.16	17.3
1	12.5	1.12	19.1	1.37	19.7
2	25.0	1.34	18.9	1.38	21.3
3	50.0	1.41	19.4	1.51	21.1
4	37.5	1.40	18.0	1.44	20.1
5	75.0	1.44	19.8	1.63	22.5
6	Check	1.13	17.2	1.28	19.3

<sup>1/</sup> Three year average 1945 - 47

<sup>2/</sup> Ammonium nitrate applied March each year at the beginning of spring growth.

Table 2.--Effect of Fertilizer and Winter Legumes on the Yield of Wheat at the Wheatland Conservation Experiment Station, Cherokee, Oklahoma

Treatment <sup>1/</sup>	Yield Per Acre					
	1946		1947		Average	
	Straw Tons	Grain Bu.	Straw Tons	Grain Bu.	Straw Tons	Grain Bu.
Check	1.04	20.9	1.23	17.9	1.13	19.4
Superphosphate	1.13	22.5	1.34	18.4	1.23	20.4
Superphosphate and ammonium nitrate	1.28	25.7	2.40	28.5	1.84	27.1
Ammonium nitrate (fall)	1.10	19.8	1.52	19.6	1.31	19.7
Ammonium nitrate (spring)	0.91	18.1	1.55	19.1	1.23	18.6
Wheat, wide row <sup>2/</sup>	0.58	12.2	0.66	11.3	0.62	11.8
Wheat, wide row and superphosphate <sup>2/</sup>	0.80	18.5	1.49	18.8	1.15	18.7
Wheat, following winter peas			1.52	26.4		
Wheat, following winter peas and superphosphate			2.27	28.8		
Winter peas <sup>3/</sup>			0.96	14.5		
Winter peas and superphosphate <sup>3/</sup>			1.14	17.6		

<sup>1/</sup> Superphosphate (20%) applied at the rate of 250 pounds per acre and Ammonium nitrate at the rate of 100 pounds per acre. Wheat planted with a 10-inch semi-deep furrow disc drill. The dates given are averages of triplicate treatments.

<sup>2/</sup> Wheat rows 20 inches apart. Sweet clover was planted between rows, but it failed due to the weather.

<sup>3/</sup> Yield of Dixie Wonder Winter Peas--Hay represented as straw.

Results of Tests on Vegetated Waterways, and Method of Field Application -  
"Oklahoma Agricultural Experiment Station Miscellaneous Publication No.  
MP-12, by Maurice B. Cox and Vernon J. Palmer, was published and released  
 this month. This bulletin presents results of four years of research on  
 the use of vegetation as a protective lining of farm waterways, such as  
 pond spillways, terrace outlet channels, and natural water courses. The  
 protective ability and hydraulic characteristics of linings of alfalfa,  
 Bermuda grass, blue grama grass, buffalo grass, weeping lovegrass, and a  
 grass mixture native to Oklahoma were determined. The results are analyzed  
 and presented in a manner such that engineers may apply them directly to  
 the design of farm waterways.

"Another report of our cooperative work released by Oklahoma A&M College  
 this month was Oklahoma Agricultural Experiment Station Mimeographic  
 Circular No. M-172, 'Progress Report of Chemicals for Brush Control',  
 by Harry M. Elwell. This circular gives the results of brush control  
 studies during the last three years."

Nitrogen Losses in Runoff and Erosion - C. A. Van Doren,  
Urbana, Illinois.-"Nitrogen losses in runoff and erosion may be as much  
 as four times greater than losses through crops when crops are sold from  
 the farm. When crops are fed on the farm, the ratio of losses from  
 erosion and from crops removed is much higher. Using available research  
 data and published soil and crop nutrient information, nutrient losses from  
 two rotations were estimated for a prevalent soil in northeastern Illinois  
 (Cayuga Ridge area). Nitrogen  $P_2O_5$ , and  $K_2O$  losses with and without  
 contouring are shown in Table I. Estimations are based upon Elliott silt,  
 5% slope, 2 erosion, 400' length of field.

Table I - Estimated annual loss of Nutrients in Crops & from Erosion & Runoff

Rotation and Practice	Nitrogen			$P_2O_5$		
	Run-off and Erosion	In Crops Sold	In Crops Fed	Run-off and Erosion	In Crops Soil	In Crops Fed
1-1-3, No practices	75 lb.	37 lb.	3 lb.	18 lb.	25 lb.	15 lb.
1-1-3, Contouring	36	37	3	9	25	15
1-1-1, No practices	173	43	15	42	29	19
1-1-1, Contouring	82	43	15	20	29	19

Above table based on assumed yields of corn, 55 bu.; oats, 45 bu.;  
 meadow, 2 tons.

Effects of Grazing Management and Soil Treatment on Runoff from Pasture  
Land - "The runoff from pasture plots on the Federal tract was summarized  
 by monthly intervals for an eight year period. Months during which  
 greatest runoff occurred regardless of treatment were February, March and  
 April. Average precipitation during these months was also high. For  
 example the average rainfall in April was 5.65 inches. Months during  
 which runoff from pasture plots was lowest were October, November,  
 December. The average precipitation was low for the period October through  
 January. The lowest average monthly rainfall of 2.06" occurred in January.



"Occurrence and amounts of runoff in relation to the needs of forage plants for moisture was analyzed by averaging the runoff from the plots for two periods of six months each (Table II). The period October-March was considered a dormant period when moisture utilization by forage plants could reasonably be expected to be at a minimum. The other six months period April-September was considered to be a critical period for moisture. In this period when plant requirements are high and growth so desirable, soil moisture is apt to be so low that little if any is available for plant growth. Management practices which decrease runoff during the growing season add moisture to the soil for potential forage production. The lowest runoff during both the dormant period and growing season was measured from the treated, moderately grazed plot. On soils requiring fertilization neither soil treatment alone nor good grazing management alone will adequately conserve moisture for forage production.

Table II - Effect of Treatment and Grazing Management on Runoff from Pastures, Dixon Springs Experiment Station-Average Eight Years-Federal Plots.

Plot	Grazing Management	Average Annual Run-off	
		Dormant Period October - March Rainfall - 18.73"	Growing Season April - September Rainfall - 23.67"
1	L P - Severe	3.79"	5.02"
2	L P - Moderate	1.36	1.74
3-4	None - Severe	3.50	4.39
5	None - Moderate	4.66	5.12

Arnot Boyce Pond (Fish Story) - John Lamb, Jr., Ithaca, N. Y.-

"The Boyce pond at the Arnot (0.9 acre area; approximately 1,000,000 gallons capacity) was stocked with 100 fingerling black bass (large mouth) and 1,000 bluegills on July 1, 1945. The pond was fertilized with the equivalent of about 1,000 pounds of 8-8-4 during the summer of 1945 and 1946. It was not possible to maintain recommended turbidity. This may have been due to the large amount of runoff passing through the pond, plus the acid reaction (pH 5.6) of the water. At the end of one year, the bass seined or caught were about 8-1/2 inches long, less than the 10 inches considered necessary for spawning. The pond was fished heavily the fall of 1946 and summer of 1947. No small bass but many bluegills were noted in 1946. The latter part of June 1947, many very small bluegills were noted but no bass. On July 15, there were small bass with a ratio of 1 to 30 bluegills. On August 5, there were many such bass with a ratio of 1 to 6.

"Due to repeated requests for fingerlings to stock District ponds in Western New York, fish were removed during August, and the pond finally drained October 31. A total of approximately 800 young bass and 7,000 young bluegills were removed. About 25 of the bass were about 5 inches long, and it is possible that these were spawned the summer of 1946. Seven of the original bass remained, and were 11-1/2 to 13 inches long. Almost 100 of the original bluegills averaged 7 inches long. The young ranged to 5 inches long. The pond was open to unsupervised and heavy fishing, but approximately 25 per cent of the original bass and bluegills were accounted for."



Snow Cover and Frost Depth at Marcellus - G. R. Free, Marcellus, New York. - "Observations of frost depth were made at the end of January at several locations at the Marcellus station with the following results:

Location	Exposure	Cover	Snow Depth	Frost Depth
			Inches	Inches
Near top of slope	West	Corn stubble	2	9
Midway position on slope	West	New seeding	3	8
Midway position on slope	West	Old meadow & weeds	7	5
Lower part of slope	West	Old meadow & weeds	9	0 - 1-1/2
Lower part of slope	West	Assorted	13 - 15	None

"There have been several reports in the local press regarding shortages of water in wells for stock watering because of continued cold weather and deep freezing of soil. The above data suggest that there might be definite advantages in a program of 'snow conservation' on wind-swept slopes."

Winter-Hardy Blue Lupines - B. H. Hendrickson, Watkinsville, Ga. - "Our 7-year strain of (bitter) blue lupine seems to have weathered a 10° F. minimum temperature, and a succession of 20 to 25° F. freezes, without much visible injury. The plants are 6 to 10 inches tall."

Soil Caking in Grain Fields Dry Planted In November 1947 - Maurice Donnelly, Riverside, California. - "A good many southern California grain farmers planted grain in the 'dry' in November, that is, they planted in summer-fallowed land before rain fell this season. An unusual structural condition was set up in many of these fields. In general, December storm intensities were low and soil crusting, ordinarily produced, was not common. Instead, the three inches of surface soil was strongly compacted, a condition that Lemmon calls soil caking. Grain seedlings had difficulty in pushing their way through this hard layer.

"This caking has caused exceedingly spotty emergence in the fields that were 'dry' planted. At the Haskell plots (San Geronio Soil Conservation District), land 'dry' planted had such a poor stand of grain at the end of December that replanting appeared necessary. On many commercial 'dry' planted fields the stand is 50 per cent or less. Grain fields planted after the December rains showed good emergence of seedlings.

"The explanation of the soil caking is not clear. High temperatures following the rains probably had something to do with it. Heavy stubble mulch prevented or reduced the compaction but light mulch covers reduced compaction only slightly."

No Significant Differences in Summer-Fallow Moisture in Plow, Sweep, and Dish Plots - Visual observations at the Haskell plots (San Geronio Soil Conservation District) in the fall of 1947 seemed to indicate that summer-fallow moisture was best conserved by disking, somewhat less so by sweeping (subtilling), and least by plowing. However, measurements of soil moisture in November did not bear out these visual impressions. These data on summer fallow soil moisture are given below.

SOIL MOISTURE, PER CENT OF DRY WEIGHT OF SOIL  
AVERAGE OF CLASS II AND CLASS III LAND

Depth	Plow	Sweeps	Disk
0" - 6"	2.0	2.5	2.4
6" -12"	4.8	4.7	4.0
12"-18"	6.5	6.7	6.6
18"-24"	8.4	8.6	9.2
24"-30"	9.1	10.3	9.4
30"-36"	9.7	10.9	10.7

Blue Lupine Shows Promise for Winter Cover in Wind Area -"Blue lupine was planted for the first time in the experimental plots at Guasti (Cucamonga-Mt. View District) in November, 1947. Planting was made in dry soil. Germination from the rains of December 1947 was fairly good and emergence was good. The young seedlings proved themselves to be considerably stronger structurally than purple vetch. Purple vetch is no longer recommended in the wind area but it is still being used by grape growers there for winter cover and was planted in the experimental plots for comparative observations."

Value of Sweetclover for Soil Conservation - J. R. Johnston, Temple, Texas.-"Two years data from the erosion plots have been summarized in the following table. These data clearly show the value of sweetclover for soil conservation. These data show that the value of oats and hubam sweetclover for soil conservation is about the same while these plants are growing on the land. However, soil loss the year after these two crops is considerably different. Land in a 2-year rotation of cotton and oats had an annual average soil loss of 13.02 tons per acre. A 2-year rotation of cotton and oats-sweetclover mixture lost 9.08 tons of soil per acre per year, while the same land in a 2-year rotation of cotton and hubam sweetclover had an annual average soil loss of 6.51 tons per acre per year. These rotations were on Austin clay soil, 3.8 percent slope - Class III land.

"The prolonged and icy weather during January damaged oats considerably, however, only a small percentage was killed.

"The sweetclover plantings which came up in late November and early December did not fare as well as the oats. The sweetclover seedlings were damaged severely by heaving. The biennial seedlings, Madrid and evergreen, did not suffer as much as the annual hubam. This difference was probably due to the larger root systems of the biennials which permitted them to resist heaving a little more effectively. All varieties of sweetclover which were fertilized with phosphate resisted heaving more successfully than the unfertilized plants. Again, this resistance can be attributed to the larger root system resulting from phosphate fertilization. Sweetclover plants growing in the drill with oats in mixed plantings resisted heaving completely, whereas those between the oat drills were heaved severely. Biennial sweetclover growth, 3 to 6 inches high, coming from old crowns (plants from 1946 fall seeding) suffered very little from the low temperatures.

"Austrian winter peas, hairy vetch, and Williamette vetch were not damaged by the cold. Canadian field peas were severely damaged, 50 to 75 percent were killed."



Effect of crops on soil erosion - Austin clay soil on 3.8 percent slope,  
Class III land.

Cropping Practice	Crop	Soil Loss - T/A			Crop yearly Average	Rotation yearly ave.
		1946	1947	Total		
one crop	corn	20.38	11.69	32.07	16.04	16.04
rotation	cotton	24.87		24.87	24.87	18.54
rotation	corn		12.20	12.20	12.20	
rotation	cotton	34.39	16.15	50.54	25.27	13.02
rotation	oats	.54	.98	1.52	.76	
rotation	cotton	18.78	16.47	35.25	17.62	
rotation	oats (h)	.23	.87	1.10	.55	9.08
rotation	cotton	21.68	3.27	24.95	12.48	
rotation	sweetclover	.28	.77	1.05	.53	6.51
one crop	bermuda gr.	.03		.03	.02	.02

Runoff on Wheat Land in Relation to Cropping Practice - Glenn M. Horner, Pullman, Washington. - "Relatively heavy runoff occurred as a result of a storm which began in the evening of January 5 and continued until the morning of January 7. The total precipitation was 1.97", but the rainfall intensity was not high. The maximum intensities recorded were 0.24 inch per hour for a 5-minute period and 0.16 inch for a 30-minute period. The flow in the South Fork of the Palouse River at Pullman was greater than any time since 1933. However, a major contributing factor to this runoff was the melting of snow in the Moscow Mountains rather than runoff from the agricultural land, which has no snow cover.

"Runoff data for some of the crop rotation plots are given below. These data are for the plots seeded to winter wheat in the fall of 1947.

Crop Rotation	Cover condition	Runoff caused by storm of Jan. 5-7 (1.97"). (Inches)
Alfalfa & grass, 4 yrs.		
-w. wheat - w. wheat-		
peas - w.wheat	Winter wheat	0.16*
Sweetclover & grass		
2 yrs.-w. wheat-		
peas - w. wheat	Winter wheat	0.51*
Winter wheat - Hubam		
clover as green manure	Winter wheat	0.53
Winter wheat - peas		
as green manure	Winter wheat	0.57
Winter wheat - peas	Winter wheat	0.66
Winter wheat - summer		
fallow	Winter wheat	1.32

\* Average of all plots in each rotation that was planted to winter wheat.



"These results show that alfalfa and grass greatly reduced the runoff after the sod was plowed and seeded to wheat. This effect has carried through the four-year period of cultivated crops for the 8-year rotation. Winter wheat seeded on summer fallowed land resulted in 67 per cent runoff compared to only 8 per cent runoff for alfalfa land seeded to winter wheat."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"The corn yields on the plowed and mulched corn areas for 1947 are given below. In 4 out of 5 years, the mulch areas have out-yielded the plowed areas. The difference has not been large enough to be highly significant. Yet we are getting good water and soil control and - at least - no reduction of corn yield.

Area	Yield
<u>Plots</u>	
Plowed	88
Mulch	
A. Disked	90
B. Plowed without moldboard	93
<u>2-acre strips</u>	
A. Plowed	64
B. Mulch (plowed without moldboard)	83
<u>Watersheds</u>	
A. Plowed in straight rows (No. 118)	48(yield in 1943 = 53 b/A)
B. Plowed on contour (No. 113)	42(yield in 1943 = 20 b/A)
C. Mulch (plowed without moldboard (No.111)	57

"It is interesting to note that the corn yield on conservation-practice watershed No. 113 increased in yield 22 bushels per acre from 1943 to 1947. In the same period poor practice watershed decreased 3 bushels per acre."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"A paper prepared by J. A. Allis, Project Engineer on 'Rates of Runoff for the Design of Conservation Structures for the Central Great Plains of Nebraska and Kansas' was completed and submitted to the Washington office on January 23, 1948."

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-

"Mr. E. R. Baugh has compiled the 1947 yield data for the soybean plots at Lafayette. The following is from his report:

"The corn plots of 1946 were disced and put in beans in 1947. All plots were handled in the same manner and no fertilizer was applied for beans. The tenant on the Throckmorton Farm plowed into one replication of plots and the yield data shown includes three replications instead of the usual four. The yield difference between plots shown in the following table can be considered due to residual effects of the 1946 tillage and fertilization differences:

Table 1.--1947 Soy-bean yield crop residue mgt. and mulch-tillage plots

Treatment Number	Preparation of cornland in 1946		Yield, Bu./A	
	Residue	Initial depth	Fertilization	
	location	of tillage	High	Low
1	Surfaced	None	11.6	11.2
2	"	3" overall	17.1	13.0
3	"	7" overall	16.6	14.4
4	Mixed, 0-3	3" overall	14.9	15.9
5	Mixed, 0-3	7" overall	19.7	18.8
6	Mixed, 0-3	7" overall	17.2	18.0
7	Under 7	7" overall	19.0	16.3
8	Under 4	4" overall	17.6	18.1
1/ 9	Under 7	11" overall	21.9	18.1

LSD<sub>05</sub> Tillage = 4.0 Fertilization = 0.4 Tillage x Fertilization = 3.0

1/Not included in statistical analysis because the plots were not properly randomized."

"Mr. Baugh also reports the following on 1947 oat yields for the mulch-tillage plots near Cromwell, Ind.:

"The oats on the Harmon Harper Farm, Cromwell, Ind., were sowed on the 1946 corn plots. The plots were disced and oats planted and fertilized with 3-12-12 at the rate of 400 lbs. on the high and 150 lbs. low fertilization rates. The results shown in the following table are due to the residual effects of the 1946 preparation and fertilization for corn, plus the additional fertilizer seeded with the oats in 1947."



1947 Oat-yield crop residue mgt. and mulch tillage plots

Harmon Harper Farm, Cromwell, Ind.

Treatment Number	Preparation of cornland in 1946 :			Yield, Bu./A	
	Residue	Initial depth	Fertilization	High	Low
	location	of tillage			
1	Surfaced	None		67.4	62.0
2	"	3" overall		90.4	89.8
3	"	7" overall		94.6	83.9
4	Mixed 0-3	3" overall		99.0	98.9
5	Mixed 0-3	7" overall		94.6	92.4
6	Mixed 0-7	7" overall		84.0	85.4
7	Under 7	7" overall		94.7	96.6
8	Under 4	4" overall		88.2	84.1

LSD<sub>05</sub> Tillage = 18.9 Fertilization = 4.6 Tillage x Fertilization = 13.61

"Statistically there is no significant difference due to fertilization or tillage x fertilization, but there is due to tillage."

Hydrologic Studies - George A. Crabb, Jr., East Lansing, Mich.-

"On January 5, a technician from Leeds & Northrup Company, the manufacturers of the pyr heliometric recorder and multiple soil thermograph recorder, overhauled each of these instruments, with the result that each is functioning properly again and producing accurate records.

"In review of the data resulting from the stubble mulch experiments it was found that average yields on small grains, wheat and oats, for the 5 years 1944 to 1947, inclusive, were higher on the plowed plots than on the stubble-mulch (disked and sweeps) tillage plots. The average yields of these crops for the 5 years were as follows:

Treatment	Yields in bushels per acre	
	Wheat	Oats
1. Normal plowing	42.6	58.2
2. Plowing w/moldboard removed	38.7	51.9
3. Disked	35.7	47.8
4. Sweeps and tredder	35.3	46.9

"Wheat and oats on the plots fitted with disks and with sweeps showed extreme nitrogen deficiency in the spring (indicated by pale yellowish-green color and substantiated by tissue tests), whereas the wheat and oats on the plots fitted by the conventional plowing and harrowing grew vigorously and had a dark green, healthy color. Tissue tests showed the presence of abundant nitrates in the plants.

"The corn yields on the average, were slightly higher on the stubble-mulch tillage plots than on the plowed plots, although corn growing on these plots showed marked potassium-deficiency symptoms in August and September; while corn growing on the plowed plots was dark green and showed no deficiency symptoms. The highest average yields were produced on the disked plots. The yields were as follows:

<u>Treatment</u>	<u>Bushels per acre</u>
1. Normal plowing	21.8
2. Plowing w/moldboard removed	21.2
3. Disked	24.2
4. Sweeps	22.3

"The average yields of clover hay were slightly higher on the plowed plots than on the stubble-mulch tillage plots, although the differences were of no consequence. Yields of clover hay were as follows:

<u>Treatment</u>	<u>Pounds per acre</u>
1. Normal plowing	3,239
2. Plowing w/moldboard removed	3,126
3. Disked	3,031
4. Plowed	3,205

Hydrologic Studies - R. W. Baird, Waco, Texas.-"The anticipated decrease in amounts of runoff from areas with conservation practices which have included an appreciable amount of permanent grass cover has not been observed from the larger areas. As a check on these observations the 3-acre areas SW-17 was reestablished January 1, 1948, to see if reestablished grasslands give results comparable to small areas of native meadow. (SW-12) The area SW-17 was spot sodded with Bermuda grass in 3-foot rows about 3 feet apart in the row. After covering, a light seeding of oats (1 bu. per acre) and Hubam clover (4 pounds per acre) was made. It is hoped that field and weather conditions in 1948 will be such that the effects of this cover can be followed."

Hydrologic Studies - T. W. Edminster, Blacksburg, Virginia.-"Mr. Holtan continued his work on the study of mechanical compaction of pond-bottom soils under varying soil moisture conditions. He has also undertaken the first steps in testing mechanically compacted samples under varying heads of water. These initial tests were designed primarily to clarify his techniques. It was found that a straight line relationship between head and degree of compaction appeared to exist. One 6-inch thick sample 'blew out' under 30-foot of head simulating closely what has been observed to occur when too thin a soil mantle is exposed to a head in the creviced limestone areas of the state."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minn.-

"Mr. Donnelly completed 14 submergence tests in 16 days during January on the box-inlet drop spillway. Nearly one-third of the scheduled submergence tests have been completed since setting up the schedule of tests last April. Miss Gosslin computed C and  $H_{e,Q=0}$  in the equation

$$Q = C L \sqrt{2g} (H_e - H_{e,Q=0})^{3/2}$$

where Q is the discharge; L the crest length;  $H_e$  the observed head plus the velocity head at the head measuring section;  $H_{e,Q=0}$  a zero correction to the head; C a coefficient; and g the acceleration of gravity. These computations were made for two groups of tests. As in the results reported last month,  $H_{e,Q=0}$  was found to be statistically significant. Values of C were found to vary with approach channel width. For  $B/W = 1$  and  $0.5$  values of C are consistent with those on which the 'rectangular spillway' report is based. However, for  $B/W = 2$  somewhat higher values of C were obtained for the box-inlet spillway tests. Here B is the box length and W its width.

"Mr. Blaisdell completed the design of a new setup for the pipe drop inlet spillway study. Much of the construction work had been completed at the end of the month although few of the component parts had been assembled.

"Mr. Blaisdell spent some time in the preparation of a closing discussion to the paper, 'Development and Hydraulic Design, Saint Anthony Falls Still-ing Basin'."

Sedimentation Studies - L. C. Gottschalk, Washington, D. C.-

"Preliminary calculations were completed on the sedimentation survey of Rainbow Lake, water-supply reservoir for the city of Spartanburg, S. C. This survey, made in March 1947, indicated that the capacity of the reservoir has been reduced at a rate of less than 1 percent a year since it was constructed in 1926.

"A news letter was prepared for the Sedimentation Subcommittee, Federal Inter-Agency River Basin Committee, outlining the sedimentation activities of the Soil Conservation Service for the period July 1-December 31, 1947."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"Regarding our moisture studies, readings during the end of the month increased rapidly, and irrigation will have to be started soon. This study has been carried on for about a year and it has shown that it could be adapted to general grove work.

"The trend of moisture conservation for the various types of mulching materials remained the same during this period. That is, the grass and pine straw are superior to shavings or natural cover. In cooperation with the Station we hope to soon start a series of mulch plots on which soil temperature, moisture readings, losses of nitrates and effectiveness of depth of mulch will be studied.



"Our studies have shown that it is much easier to maintain a nitrate level of 50-100 p.p.m. in young plantings where a grass mulch is used than on those areas which are kept clean tilled. Our studies so far show that mulching is very important not only in conservation of moisture but also in the conservation of plant food.

"Chloride samples from our lines covering the Homestead area, Goulds, Military and North Canals show that there has been an increase in that area covered by tidal waters. On the Goulds Canal we had an increase at the 1/4-mile and 1/2-mile stations. This might have been the residual effect of the excessive high tides of a month ago or it might have been caused by the inflow of brackish water when the gates were out in early December. We have also had an increase on the North Canal 2 miles back from the proposed structure. This area is protected by the pump chloride structure 1 mile east. The cause of this rise is that a lateral from the Mowry Street Canal dead ends in this area and during the period of high tides a month or so ago brackish water was backed into this area and I believe the increase in concentration was caused by this."

Supplemental Irrigation Studies - James Turnbull, Lake Alfred, Florida.-"Rainfall during January was exceptionally high, with over 7-1/2 inches recorded at the experimental plots. This is 5 inches more than the average for the month. As a result of the excessive rainfall, water-table wells and lake level rose rapidly, with the lake reaching the highest level noted since the establishing of records. The rise in lake level endangered our irrigation pumping plant and it was necessary to dismantle it and remove it to storage at the Experimental Station. On the morning of January 15 the temperature dropped to 27 degrees in the experimental grove. There was no evidence of damage either to the fruit or foliage, however."

Drainage Studies - T. W. Edminster, Blacksburg, Virginia.-"During the first week in January, Mr. Walker made additional tile movement, siltation and silt sampling determinations on the Lee farm test. He also completed final adjustment and calibration of the automatic draw-down equipment. A number of records have been obtained on this equipment; however, some difficulty with freezing was experienced due to the extremely low temperatures that existed during one week in January.

"Mr. Turner completed the initial laboratory runs on the 3-inch and the 4-inch permeability cores. Three soil types were studied giving a total of ten horizons. A portion of the statistical analysis of the data has been completed. It appears that there is no significant difference in the rate of percolation between the 3-inch cores driven into the soil and the 3-inch cores jacked into the soil. Analysis of other comparisons is now underway."

## IRRIGATION DIVISION

Conservation of Irrigation Water by Spreading for Storage Underground - Dean C. Muckel, Hayden K. Rouse, and A. T. Mitchelson, Berkeley, Calif.-"A field inspection of the San Joaquin Valley spreading plots was made during the month of January. Percolation data for the Wasco ponds were collected. The Madera plot was inspected, and the spreading program for 1948 was discussed with other members of the Division working on this project and with cooperative workers of the Bureau of Reclamation. The plot is now ready for spreading of water, but owing to the current drought it is not known just when water will be available. Water for irrigation of experimental grass crops on the plot has been purchased from one of the pumping plants of a neighboring farmer.

"Several days were spent summarizing data from the Wasco ponds. Average rates for 15-day periods and cumulative rates were calculated. Various treatments tried on the ponds are being classified as to whether or not they were beneficial to infiltration, particularly on 60-day continuous runs."

Irrigation Enterprise Study - Wells A. Hutchins, Berkeley, Calif.-"The work on this study (a cooperative project with BAE) consisted of further analyses of various topics reported in the field schedules, and of preparation of portions of the final chapter of the report. This final chapter is devoted to experiences of the various enterprises with their irrigation organizations, and to the advantages and disadvantages of the several types of organization. This chapter has not been completed. Most of the remainder of the report is done. Some enlargement of the topic of success or failure of enterprises is necessary, because as originally written, the observations are not supported by concrete examples; and some of the other topics appear to need a little revision.

"One of the inquiries in the study was whether some other form of irrigation organization would have given better results on each of the projects studied. Some of the answers are not conclusive or satisfactory; under some circumstances, the best considered answer to such question may be debatable. However, insofar as the enterprises in the study are concerned, both the irrigation district and the mutual irrigation company appear to be generally suited to the purposes of the enterprises for which they are respectively used, and in many of these cases it appears doubtful that an organization of another type would have done better. The commercial irrigation company, on the whole, appears definitely less satisfactory than either of the other types for the existing conditions of the projects studied. The commercial company has performed with reasonable satisfaction on some of the projects for which it is now used, but its field of usefulness appears to be more limited than that of either of the other principal types of organization. In fact, many of the present districts and mutual companies began as commercial enterprises and, for one reason or another, were replaced by organizations owned and controlled by the water users."



Irrigation Practices and Consumptive Use of Water in Pajaro Valley - Paul A. Ewing, Berkeley, Calif.-"Principal effort was to analyze results of field work on Pajaro project so as to have them available for conference with Blaney, now planned for February. The field results were received from Area Conservator Seibert, December 31, 1947. They proved to be excellent in every respect, representing about one-fifth of the entire area (2,500 acres; 44 fields). Analysis was carried as far as possible in absence of detailed maps from California Division of Water Resources, now promised for delivery this week (February 1-8). As soon as they are received I hope to spend several days with Blaney and get my part of the project on its way to completion. The field canvass disclosed a more economical irrigation practice in Pajaro Valley than in neighboring Salinas Valley. Detailed comparisons will be reported later."

Utah Drainage Districts - J. Howard Maughan, Logan, Utah.-"Summaries of data for each of Utah's 38 drainage districts in a state-wide survey of drainage show a striking similarity in the problems encountered by the districts both in the physical and institutional aspects. In general, financing was carried out by means of bond issues and all of the districts encountered troublesome economic problems. The degree of success achieved in developing and maintaining adequate drainage of the farm land varied widely from district to district. In most cases heavy responsibilities were placed on the three district supervisors chosen from among the farmers. The degree of success achieved by the districts reflected, in considerable measure, the abilities of the supervisors."

Silt Studies - Dean W. Bloodgood, Austin, Texas.-"The preliminary inventory of published and unpublished sediment load data for Texas streams was completed during the month. The inventory contained 92,733 daily observations of 1 to 3 water samples each day from 42 sampling stations on 12 of the main watersheds of Texas. Silt deposition from irrigation waters was also included for the Colorado River at the United States Yuma Field Station, Bard, California.

"On the 6th, representatives of the Army Engineers at Galveston; SCS at Fort Worth; USGS at Austin, State Board of Water Engineers, and myself made a trip to the San Saba silt station on the Colorado River for the purpose of making preliminary arrangements for testing Texas or Department of Agriculture sampler with the US D-43 sampler (one used by the Army Engineers and USGS). Upon examination of conditions at the site of the proposed observations it was noted considerable preliminary work would be necessary before the US D-43 sampler could be installed. The sampler, boom, etc. is heavy and bulky and it will be necessary to install it permanently to a member of the steel highway bridge. Before this can be done the consent of the Texas Highway Department must be obtained. The wire cable used for lowering and raising the 50 to 60 pound sampler was too short by about 15 feet. A number of adjustments must be made



before the installation can be completed. The Army Engineers loaned us the sampler and it is now stored in our cooperative silt laboratory. When funds and personnel are available, another attempt will be made to make the installation and tests.

"On the 7th I attended a conference in the Board's office regarding the clarification of an existing controversy pertaining to the original capacity of Lake Corpus Christi reservoir. In a silt survey made by the Sedimentation Division, SCS, several years ago a capacity figure used in their determination was questioned by the Board of Water Engineers. The purpose of the conference was to sit around the table and try to adjust the difference. This was accomplished and the Topographic Division, USGS, will probably be requested to make a resurvey of the area occupied by the lake and adjacent land."

Irrigation Studies - Dean W. Bloodgood, Austin, Texas.--"During the month we had one 6-inch and one 1-foot metal Parshall flume made for the measurement of water in the Eagle Pass Area of the Rio Grande Valley. Also, weir plates for the installation of three weirs to be used in the same area were made for the proposed irrigation studies. One of the areas consists of about 800 acres and made up of several farms (very fine silt loam) which grow cotton, feed crops, and vegetables; one farm of 200 acres (clay loam) - mostly cotton; one farm of 60 acres (clay, heavy soil) - mostly spinach and vegetables; one farm of 150 acres (clay loam) - entirely a variety of vegetables; and one farm of 125 acres (loam) - entirely of cotton. It is proposed to carry on soil moisture and water-penetration work in connection with the studies. The installation of most of the water measuring devices will be completed in February and the irrigation studies for cotton will commence as soon as some of the installation have been completed."

Miscellaneous - Dean W. Bloodgood, Austin, Texas.--"During the month I also prepared and had mimeographed a Progress Report of Cooperative Silt, Irrigation and Evaporation Research Studies in Texas during 1947. This 35-page report contained a summary of the results obtained during 1947, a number of figures illustrating some of the features of the work, and a brief summary of proposed water studies that might be undertaken in Texas. An estimate of costs for the proposed studies were omitted for the reason prices are very unstable and are increasing. Some of the prices or estimates available several months ago have doubled."

Consumptive Use - John S. James, Billings, Mont.--"It seems evident that no close correlation of existing data on consumptive use of water will be found. Observed stream-basin depletion is affected by other conditions than temperature such as relative humidity and wind movement of which no records are available generally. Also, unknown conditions of vegetative growth materially affect moisture consumption.

Carry-over of underground storage markedly modifies the apparent consumption for any year or other definite period. Furthermore, available precipitation records may not truly reflect the average conditions of a drainage area.

"However, analysis of the records of runoff and precipitation for 11 non-irrigated areas seems to indicate a fairly consistent relationship between temperature and moisture consumption. Present indications are that a useful expression of this relationship can be developed. It is hoped that some more definite report of progress can be made in the near future."

Irrigation Studies in Denver, Colo. - Ivan D. Wood.-"Delivered paper entitled 'Irrigation, Past, Present and Future' at the Southern Great Plains Council meeting.

"Irrigation schools were held at Texline, Amarillo, Canyon, Hereford, Dimmitt, and Tulia. Persons met: County Extension Agents at above-mentioned points, as well as SCS personnel and personnel of other agencies. Conducted irrigation schools in six points. These were attended by farmers who registered for the work and who will attend five meetings in all--one each week. Attendance at these schools was as follows:

	<u>1st School</u>	<u>2nd School</u>
Texline	25	28
Amarillo	15	12
Canyon	49	53
Hereford	39	45
Tulia	78	97
Dimmitt	55	53

"Gave work on well construction, irrigation pumps and power plants, and water application. At each point care was taken to correlate information given with work being done in the local SCS district."

Irrigation Studies in Colorado - Carl Rohwer, Fort Collins, Colo.-"Plans were prepared by R. L. Parshall at the request of SCS Operations of the Soil Conservation for a vortex-tube sand trap for an irrigation ditch at Holbrook, Ariz.

"The galley proof of the report on Seepage Losses from Irrigation Channels was read and checked by Carl Rohwer. A report was prepared on the work accomplished on various projects in 1947 together with a summary of the results for all projects. The budget and research needs for the future were outlined in another report. Equipment was installed in the Hydraulic laboratory at Ft. Collins for making additional tests on the losses through 8-inch swing check valves. Some progress was made in assembling the equipment for the tests on Performance of Well Screens. Tank and screens for the tests have been received."

Consumptive Use Studies - Upper Colorado River - Harry F. Blaney, Los Angeles, Calif.-"The study of consumptive-water requirement for areas in the Upper Colorado River Basin was continued in cooperation with the Engineering Advisory Committee to the Upper Colorado River Basin Compact Commission. One of the functions of this committee is to determine the amount of water consumed by irrigated crops and natural vegetation for the purpose of allocating the waters of the river among Arizona, Colorado, New Mexico, Utah, and Wyoming. The membership of the committee consists of representatives from the United States Bureau of Reclamation and the State Engineers of the five Upper Basin States.

"At a meeting of the committee in the office of the State Engineer of Wyoming on January 16 and 17, 1948, a procedure for estimating water consumption from climatological data was outlined. A sub-committee of four was appointed to assist in computing the consumptive use of water. This sub-committee met in the Irrigation Division office, Los Angeles, on January 26 to 30, inclusive, for this purpose. The following tabulation illustrates the tentative results obtained for irrigated crops during the growing season at several Weather Bureau Stations."

Location	Consumptive use, inches (Tentative)					
	Alfalfa	Grass hay	Small grain	Corn	Beans	Other annuals
<u>ARIZONA</u>						
Chinle	25.7	22.6	15.4	20.1	15.4	20.1
Keyenta	30.1	26.6	15.3	20.6	15.3	20.6
<u>COLORADO</u>						
Durango	19.6	17.3	14.1	17.3	14.1	17.3
Grand Junction	34.3	30.3	14.6	20.3	14.6	20.3
<u>NEW MEXICO</u>						
Bloomfield	27.5	24.3	15.2	20.1	15.2	20.1
Shiprock	29.5	26.1	15.5	20.7	15.5	20.7
<u>UTAH</u>						
Duchesne	20.6	18.2	14.6	----	14.6	----
Moab	33.2	29.3	15.4	21.0	15.4	21.0
<u>WYOMING</u>						
Dixon	16.5	14.6	13.8	----	13.8	----
Green River	20.2	17.9	14.8	----	14.8	----



Studies on Rainfall Disposal Investigations - Upper Santa Ana River - Dean C. Muckel, Pomona, Calif.-"Soil samples were taken in the Puente foothill areas in connection with the study on rainfall disposal. Nearly all soil moisture resulting from light rains in December had been evaporated or consumed by the grasses. The moisture content was about what it was at the end of the summer period. This is unusual as sufficient rains usually occur in December and January to replenish the fall moisture deficiency.

"A progress report covering work to date in Chino Basin was completed in rough-draft during the month. It was found that the annual contribution to the ground-water supplies resulting from rains falling on the valley floor varied from 1,000 to 220,000 acre-feet during the 20-year period ending with the winter of 1946-47. The average contribution was 58,000 acre-feet per year. The contribution resulting from deep penetration of irrigation was 21,700 acre-feet for a normal irrigation season with the present type of crops and irrigation practices.

"Southern California is now experiencing one of the driest periods on record. This calendar year 1947 was the driest in 70 years of Weather Bureau record with only a little over 4 inches of rain occurring at Pomona. Average is about 18 inches. Irrigation on citrus and other crops has been necessary since early last spring and has continued through January of this year. The draft on the ground-water supplies is being reflected throughout the South Coastal Basin by lowering water tables. Dry land hay and grain is, of course, suffering. A light rain in December started grain and pasture growth, but this moisture has all been depleted. Normally, rain in November and December are sufficient to stop irrigation and provide moisture for dry land crops. The usual rainy season ends about the end of March."

Soil Sample Studies - Upper Santa Ana River - V. S. Aronovici, Pomona, Calif.-"Soil samples were secured at fall deficiency stations 1 to 20. Soil-profile descriptions were completed. Sampling was for the purpose of obtaining volume weights, wilting points and field capacities. Thirty 'undisturbed' soil samples were secured in 1-inch cylinders. These samples were saturated under 20 centimeters vacuum and subjected to a tension of one-third atmosphere. Rates of moisture withdrawal were carefully observed. In all cases, rates of withdrawal showed sharp reduction between 8 and 12 hours. Comparison of moisture percentages at this point with field observed field capacities showed the laboratory values to be somewhat lower than the field, but very much closer to field values than moisture retained in the soil at equilibrium with one-third atmosphere tension."

San Fernando Valley Investigation - William W. Donnan, Los Angeles, Calif.-"Rainfall records from the beginning of recording in 1922 have been secured and are being analyzed. When compared to the hydrographs from keywells; there appears to be a direct correlation between the yearly cycle of water-table fluctuations and rainfall. The wet and dry rainfall periods of about three year duration appear to influence the water-table trend with a redundant delay of about one year between cause and effect.

"On the other hand, the abnormal dry fall and winter of this year has given the project an opportunity to check on the fluctuations of the water table in the shallow wells. Although practically no rain has fallen this fall and winter, there is a distinct rise in the water-table elevations in the shallow wells. This possibly is attributable to a seasonal increase in irrigation."

V. S. Aronovici, Pomona, Calif.-"As a result of a preliminary soil investigation on a selected portion of San Fernando Valley, a report containing a presentation of the data collected was completed. Recommendations for future study were submitted. To summarize, it was found that in the area studied, subsoil and substrata sediments were poor media for tile installation. Tile spacing, to be effective, may be prohibitively close. This statement is based upon permeability coefficient measurements of the most porous materials found. Should the quantity of water to be drained be found very small, then tile spacings may not be too close."

Imperial Valley Drainage Investigations - George B. Bradshaw, Imperial, Calif.-"To date two deep wells have been installed for research vertical drainage purposes in the Imperial Valley. One well is located on the East Highline Canal at Lot 10 bordering the East Imperial Mesa. The other well is located on the West Side Main and Wormwood canals at Lot 4 bordering the west Imperial Mesa.

"The west side well is pumping at the rate of 570 gallons per minute from a 26-foot drawdown. At this pump discharge the well has little influence beyond a 1,000 foot radius from the well. This well is probably pumping at maximum discharge now because of the thinness of the aquifer.

"The east side well is pumping 1,700 gallons per minute from a drawdown of 32 feet. At this discharge an influence is felt at 3,000 to 4,000 feet perpendicular to the east highline canal. The piezometers parallel to the canal show an influence 1,500 to 2,000 feet from the well. However, the biggest drop in the water table occurs on the logs perpendicular to the canal. This well discharge can probably be increased considerably by installing a larger pump."